Development of the *2016-2017 ARFVTP Investment Plan Update*

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Alternative and Renewable Fuel and Vehicle Technology Program
Advisory Committee Workshop
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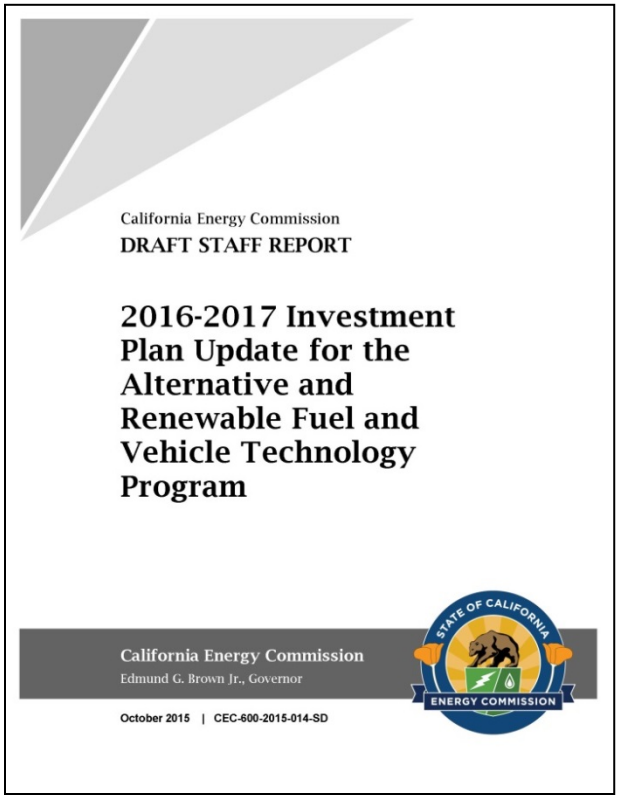
Investment Plan Purpose

- Basis for FY 2016-2017 solicitations, agreements and other funding opportunities
- $100 million funding allocation for a portfolio of fuels, technologies, and supporting elements
- Funding allocations for categories (not individual projects)



Investment Plan Update Schedule

Activity	Date
Release Staff Draft	October 22, 2015
First Advisory Committee Meeting	November 6, 2015
Release Revised Staff Draft	By January 10, 2016
Second Advisory Committee Meeting	Late January 2016
Release Lead Commissioner Report	March 2016
Business Meeting Approval	April 2016

New Considerations for 2016-2017

- Sustainable freight
- LCFS re-adoption and updates
- Natural gas carbon intensity and low NO_X engines
- Second AB 8 report on hydrogen stations and fuel cell vehicles

Structure of the *2016-2017 Investment Plan Update*

- Context of the Investment Plan Update
- Alternative Fuel Production and Supply
- Alternative Fuel Infrastructure
- Alternative Fuel and Advanced Technology Vehicles
- Related Needs and Opportunities
- Summary of Funding Allocations

Biofuel Production and Supply

- Opportunities exist for the ARFVTP to expand high-volume, low-carbon biofuel production in California

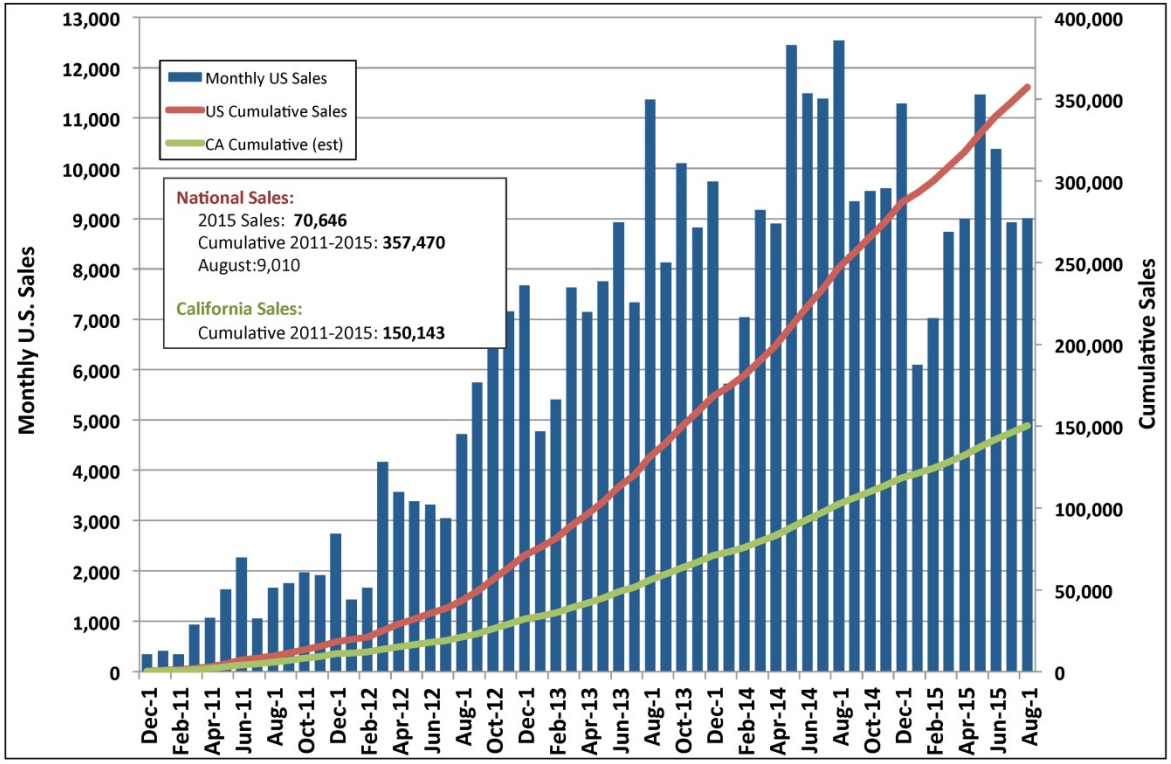
Fuel	Pathway	Carbon Intensity	GHG Emission Reduction
Ethanol	Corn Stover	41.05 gCO_2e/MJ	59% lower than gasoline
Renewable Diesel	Plant Oils	53.21 gCO_2e/MJ	48% lower than diesel
Biomethane	High Solids AD	-22.93 gCO_2e/MJ	125% lower than diesel

- Governor Brown's objective to reduce petroleum use in cars and trucks by up to 50 percent by 2030

Biofuel Production and Supply

- Proposed $20 million allocation
  - Covers multiple fuel types, and multiple phases of technological maturation
- May place greater emphasis on benefits per dollar, or target more advanced pathways or feedstocks
- Policy Goals Supported:
  - GHG Reduction
  - Petroleum Reduction
  - In-State Biofuels Production
  - Low Carbon Fuel Standard

Electric Charging Infrastructure



Source: California Plug-in Electric Vehicle Collaborative

Number of PEVs on California roads steadily increasing

Investments by ARFVTP need to keep pace with continued PEV growth

Electric Charging Infrastructure

EVCS Funded by ARFVTP To-Date

	Residential	Multi-unit Dwelling	Commercial	Workplace	DC Fast Chargers	Total
Installed	3,937	143	1,777	162	30	6,049
Planned	-	96	1,041	239	90	1,466
Total	3,937	239	2,818	401	120	7,515

- Cumulative awards to-date: $40.7 million
- Need to continue investments to achieve *ZEV Action Plan* Goals

Electric Charging Infrastructure

Benchmarks towards 2020 ZEV Action Plan Goal

	Scenario	Public & Private Non-Residential Level 2	Estimated ARFVTP Cost ($ millions)	Public Fast Chargers	Estimated ARFVTP Cost ($ millions)
Additional EVCS Needed	2017				
	Home-Dominant	13,659	$20.5	-	-
	High Public Access	32,429	$48.6	289	$4.3
	2018				
	Home-Dominant	17,805	$26.7	18	$0.3
	High Public Access	40,239	$60.4	364	$5.5

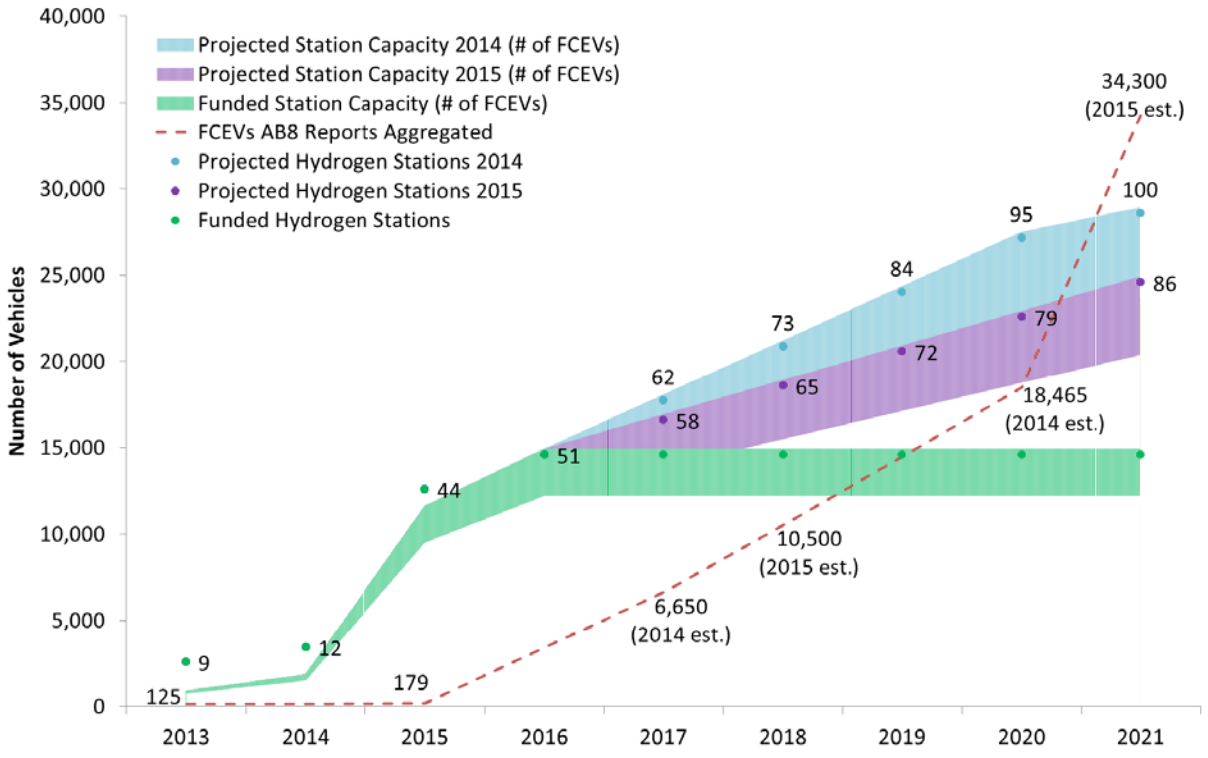
Electric Charging Infrastructure

- Proposed $17 million allocation
- Potential emphasis on deployment of EVCS at multi-unit dwellings and fast chargers
- Utility-owned EVCS proposals pending approval by CPUC
- Policy Goals Supported:
  - GHG Reduction
  - Petroleum Reduction
  - Low Carbon Fuel Standard
  - Air Quality
  - ZEV Mandate

Hydrogen Refueling Infrastructure

- 13 ARFVTP-funded stations operational, up to 7 more expected by year end
- Hyundai and Toyota FCEVs currently available
- Fueling station priority areas and purpose derived from AB 8 Annual Evaluation

Hydrogen Refueling Infrastructure



Source: California Air Resources Board

Local capacity shortfalls predicted 2018

Statewide capacity shortfalls predicted 2021

Hydrogen Refueling Infrastructure

- Proposed $20 million allocation, consistent with recommendations in 2015 AB 8 Annual Evaluation
  - Estimated to be sufficient for 7 or 8 stations, plus O&M
- Operations & Maintenance funding needed to support business case of station developers
- Policy Goals Supported:
  - GHG Reduction
  - Petroleum Reduction
  - Low Carbon Fuel Standard
  - Air Quality
  - ZEV Mandate

Natural Gas Fueling Infrastructure

- Most private fleets can access capital for fueling station equipment, installation, and operation
- ARFVTP prioritizes school districts and other municipal fleets which have restricted access to capital
- Proposed $2.5 million allocation
- Policy Goals Supported
  - Petroleum Reduction
  - Air Quality
  - Low Carbon Fuel Standard
  - GHG Reduction (w/ biomethane)

Natural Gas Vehicles

- Less favorable price difference compared to diesel
  - **April 2014**: CNG $2.69, Diesel $3.90. Difference = **$1.21**
  - **April 2015**: CNG $2.64, Diesel $3.03. Difference = **$0.39**
- LCFS re-adoption increased CNG carbon intensity

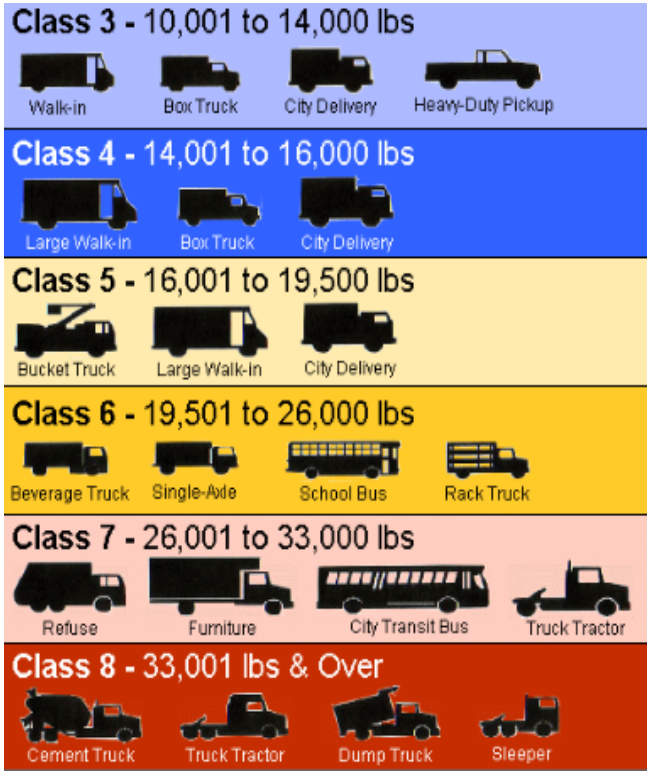
Natural Gas Vehicles

- Biomethane fuel opportunities
  - Revised carbon intensity values 50 to 125 percent below diesel for biomethane CNG
- Low NO_X engines available as soon as Q2 2016
  - NO_X emissions 90 percent lower than existing diesel standard
  - Initially available as 8.9 liter engine
  - 6.7 liter and 12 liter engines also expected

Natural Gas Vehicles

- Proposed $10 million allocation
- Potentially limit incentives to low NO_X engines, if available for specific vehicle type and class
- Potentially target fleets to combine low NO_X engines with biomethane fuel use
- Policy Goals Supported:
  - Petroleum Reduction
  - Air Quality
  - Low Carbon Fuel Standard
  - GHG Reduction (w/ biomethane)

MD/HD Vehicle Technology Demonstration and Scale-Up



Source: Oak Ridge National Laboratory

Class 3 through 8 Vehicles

- GVW of 10,001 lbs and above
- 3 percent of California vehicles
- 23 percent of on-road GHG emissions
- Significant opportunity to reduce GHG emissions
- Unique solutions required for each vehicle type and weight

MD/HD Vehicle Technology Demonstration and Scale-Up

- Sustainable Freight
  - Executive Order B-32-15
  - Multi-agency effort
  - Improve freight efficiency, transition to zero-emission technologies, increase freight system competitiveness
- Potentially fund new project types
  - Refueling infrastructure
  - Specific freight corridors
  - Non-propulsion technologies

MD/HD Vehicle Technology Demonstration and Scale-Up

- Proposed $23 million allocation
- Implementation of forthcoming *California Sustainable Freight Action Plan* likely to involve ARFVTP
- Prior solicitation (PON-14-605) oversubscribed
  - Higher differential cost
  - Heavier class vehicles
  - More capable vehicles
  - More advanced powertrains
- Policy Goals Supported:
  - Petroleum Reduction
  - Air Quality
  - Low Carbon Fuel Standard
  - GHG Reduction

Related Needs and Opportunities

- Emerging Opportunities
  - Proposed $3 million allocation based on historical demand
- Workforce Training and Development
  - 14,700+ trainees; over 240 businesses assisted
  - Proposed $2.5 million allocation based on anticipated need
- Regional Readiness
  - Continued need for planning and implementation support
  - Proposed $2 million allocation

Next Steps for the 2016-2017 *Investment Plan Update*

- Seeking feedback from all stakeholders
  - Comments requested no later than November 16, 2015
  - E-commenting available at:

    http://energy.ca.gov/altfuels/2015-ALT-01/

- Release Revised Staff Draft by January 10, 2016

- Second Advisory Committee meeting in late January 2016

Proposed Funding Allocations

Category	Funded Activity	Proposed Funding Allocation
Alternative Fuel Production	Biofuel Production and Supply	$20 million
Alternative Fuel Infrastructure	Electric Charging Infrastructure	$17 million
	Hydrogen Refueling Infrastructure	$20 million
	Natural Gas Fueling Infrastructure	$2.5 million
Alternative Fuel and Advanced Technology Vehicles	Natural Gas Vehicle Incentives	$10 million
	Medium- and Heavy-Duty Advanced Vehicle Technology Demonstration and Scale-Up	$23 million
Related Needs and Opportunities	Emerging Opportunities	$3 million
	Workforce Training and Development	$2.5 million
	Regional Readiness	$2 million
	Total Proposed	$100 million

Backup Slides

Category	Funded Activity	2014-2015	2015-2016	2016-2017 (Proposed)
Alternative Fuel Production	Biofuel Production and Supply	$20	$20	$20
Alternative Fuel Infrastructure	Electric Charging Infrastructure	$15	$17	$17
	Hydrogen Refueling Infrastructure	$20	$20	$20
	Natural Gas Fueling Infrastructure	$1.5	$5	$2.5
Alternative Fuel and Advanced Technology Vehicles	Natural Gas Vehicle Incentives	$10	$10	$10
	Light-Duty Electric Vehicle Deployment	$5	-	-
	Medium- and Heavy-Duty Vehicle Technology Demonstration and Scale-Up	$15	$20	$23
Related Needs and Opportunities	Manufacturing	$5		
	Emerging Opportunities	$6	$3	$3
	Workforce Training and Development Agreements	$2.5	$3	$2.5
	Regional Alternative Fuel Readiness and Planning	-	$2	$2
Total		$100	$100	$100